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TRANSLATIONS FROM AND INTO ALL LANGUAGES PREPARED BY SPECIALISTS

P.O. BOX 239
LYNNFIELD, MA 01940
(781) 334-3123
FAX (781) 334-4445

VERIFICATION OF TRANSLATION

Title of Translated Document: INTERNATIONAL PRELIMINARY REPORT ON
PATENTABILITY
International Application No.: PCT/EP2004/007546

Original Language of Translated Document: **German**

The undersigned declares that:

1. I am a professional translator with English as a native language and German as an acquired language. With 20 years of full-time translating experience in general, medical, technical, chemical and related fields.
2. To the best of my knowledge and belief, the attached is a true, accurate and complete English translation of the above-referenced German document

Date: January 17, 2006

Signature: David Loewus
David Loewus

PATENT COOPERATION TREATY
PCT
INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

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|---|--|--|---|---|--|
| Applicant's or agent's file reference PG 06094WO | | FOR FURTHER ACTION | | See Form PCT/IPEA/416 | |
| International Application No. PCT/EP2004/007546 | | International filing date (<i>day/month/year</i>) 9 July 2004 | | Priority date (<i>day/month/year</i>) 19 July 2003 | |
| International Patent Classification (IPC) or national classification and IPC F01P3/20, B60T 1/087, F16D57/04 | | | | | |
| Applicant VOITH TURBO GMBH & CO. KG et al. | | | | | |
| <p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the Applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 6 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> (<i>sent to the Applicant and to the International Bureau</i>) a total of 5 sheets, as follows:</p> <p style="padding-left: 40px;"><input checked="" type="checkbox"/> sheets of the description, claims, and/or drawings, which have been amended and are the basis for this report, and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p style="padding-left: 40px;"><input type="checkbox"/> sheets that supersede earlier sheets, but which this Authority considers contains an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. 1 and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (<i>sent to the International Bureau only</i>) a total of <i>i></i> (indicate type and number of electronic medium(media), containing a sequence listing and/or a table related thereto, in computer readable form only, as indicated in the Supplemental Box relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p> | | | | | |
| <p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the Office Action</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step, and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Statement with grounds according to Article 35(2) with regard to novelty, inventive step, and industrial applicability; documents and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input checked="" type="checkbox"/> Box No. VIII Certain observations on the international application</p> | | | | | |
| Date of submission of the request 17 May 2005 | | | Date of completion of this report 7 November 2005 | | |
| Name and mailing address of the International Patent Examination Authority [symbol] European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Netherlands Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016 | | | Authorized officer Paquay, J [symbol] European Patent Office Tel. +31 70 340-3944 | | |

**INTERNATIONAL PRELIMINARY
REPORT ON PATENTABILITY**

International Application No.
PCT/EP2004/007546

Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This report is based on the translation from the original language into the following language, which is the language of the translation furnished for the purposes of:

- ☐ international search (under Rules 12.3 and 23.1 (b))
- ☐ publication of the international application (under Rule 12.4)
- ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the elements* of the international application, this report is based on (*replacement sheets that have been furnished to the Receiving Office in response to an invitation under Article 14 and are referred to in this report as "originally filed" and are not annexed to this report*):

Description, Pages

1, 3-11 as originally filed
2 received on 05/17/2005 by fax

Claims, No.

1-10 received on 05/17/2005 by fax

Drawings, Sheets

1/9-9/9 as originally filed

☐ a sequence listing and/or any related table(s) – see Supplemental Box relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

- ☐ description, pages:
- ☐ claims, Nos.:
- ☐ drawings, sheets/figs:
- ☐ sequence listing (*specify*):
- ☐ any table(s) related to the sequence listing (*specify*):

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure filed for the reasons given in the opinion of the Authority, as indicated in the Supplemental Box (Rule 70.2 (c)).

- ☐ description, pages:
- ☐ claims, Nos.:
- ☐ drawings, sheets/figs:
- ☐ sequence listing (*specify*):
- ☐ any table(s) related to the sequence listing (*specify*):

* If item 4 applies, some or all of those sheets may be marked "superseded."

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Box No. V Statement with grounds according to Article 35 (2) with regard to novelty, inventive step, and industrial applicability; documents and explanations supporting such statement

1. Statement
- | | | |
|-------------------------------|------|--------------|
| Novelty (N) | Yes: | Claims 1-10 |
| | No: | Claims |
| Inventive step (IS) | Yes: | Claims 1-10 |
| | No: | Claims |
| Industrial applicability (IA) | Yes: | Claims: 1-10 |
| | No: | Claims: |

2. Documents and explanations (Rule 70.7):

See Annex

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings and on the question of whether the claims are fully supported by the description are made:

See Annex

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Regarding Item V

Statement with grounds with regard to novelty, inventive step, and industrial applicability; documents and explanations supporting such statement

Reference is made to the following document:

D1: US A 2,287,130 (RAMEY) 23 June 1942 (1942-06-23)

The document **D1** is regarded as closest prior art with respect to the subject of claim 1. It discloses (the references in parentheses refer to this document) a coolant circuit (Figure 1) of a motor vehicle (page 1, column 1, lines 1 and 2), comprising a coolant ("water," page 2, column 1, line 33), a coolant pump (17) having a coolant outlet (11); a retarder (20), provided with a stator and a central ring (44), the working medium of which is the coolant, whereby the central ring corresponds to the part of the working chamber of the retarder that is arranged in the flow direction of the coolant downstream of a coolant-carrying retarder inlet region; a reversing valve (13) in the flow direction upstream of the retarder (20) and a bypass section (14) for bypassing the retarder (20), such that the retarder (20) can be connected to and disconnected from the coolant circuit (page 3, column 1, line 72 to column 2, line 7); the coolant pump (17) being arranged in the flow direction upstream of the retarder such that, when the retarder is connected, it pumps coolant into the retarder (via line 20') and, when the retarder is disconnected, it pumps coolant past the retarder via the bypass section (14).

The document D1 differs from the subject of the first claim in that it makes no quantitative statement regarding the total flow resistance from the outlet of the coolant pump (11) up to the central ring (44) of the retarder, which, according to the claim, is lower when the retarder is connected than the total resistance to flow of the coolant circuit to be overcome by the coolant pump in the non-braking mode.

In addition, document D1 differs from the subject of the first claim in that, among

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other things, in document d1:

- the coolant pump, the reversing valve, and the retarder are not arranged, when the retarder is connected, in the order mentioned in the claim in the coolant circuit in the flow direction directly one after the other and/or,
- the stator of the retarder has only one holes (claimed: "holes") for introducing working medium into the working chamber of the retarder.

On account of this difference, the subject of the first claim is novel (Article 33(2) PCT).

A practitioner in the field of retarders will not, without being inventive, make the resistance from the outlet of the coolant pump up to the central ring of the retarder lower, when the retarder is connected, than a predetermined reference value (lower than, for example, the claimed total resistance to flow of the coolant circuit in the non-braking mode). The reason for this is that, in the braking mode, the retarder has to be capable of affording a large resistance, for which reason it is not obvious, especially in this case, to lower the resistance (in, for example, the line 20') between the coolant pump and the central ring (because even this resistance, be it minimal, contributes to a better braking performance). For this reason, the subject of the first claim can be regarded as inventive.

The claims 2 to 10 are dependent on claim 1 and accordingly fulfill as well the requirements of the PCT with respect to novelty and inventive step.

Regarding Item VIII.

The application does not fulfill the requirements of Article 6 of the PCT, because the subject of the claims 1 to 3 and 8 to 10 are¹ not clear.

1. Regarding claim 1: The subject for the patent protection is not clearly defined. An attempt is made to define the subject by way of the result to be achieved (a

¹ [Translator's Note] sic

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comparison of a total resistance of a subsystem in the braking mode to a total resistance of another subsystem in the non-braking mode). However, only the problem to be solved is presented in this way, without offering the technical features that are required for achieving this result (namely, for example, how the resistances are produced). This has the consequence that the definition of the subject of this claim is not clear (Article 6 PCT).

2. Regarding claim 2: Here, too, the subject for the patent protection is not clearly defined. An attempt is made to define the subject by way of the result to be achieved (a resistance difference of up to 30%). However, only the problem to be solved is presented in this way, without offering the technical features that are required for achieving this result
3. Regarding claims 1 and 2: These claims contain the reference number “2.1” for the central ring. However, this number cannot be located in the figures and this leads to a lack of clarity regarding the claimed central ring.
4. Regarding claims 1, 3, and 8 to 10: Claim 1 contains subsections that correspond precisely to claim 3 (1.6.1), to claim 8 (1.6.2), to claim 9 (1.6.3), and to claim 10 (1.6.4). This double claiming of the same features is confusing to the reader and leads to a lack of clarity (Article 6 PCT).

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also exists in the case when the retarder is not connected at all – for example, when it is emptied. However, as a rule, the retarder is employed for only a relatively short period of time in comparison with the normal driving mode (without braking of the vehicle by using the retarder). Finally, a higher power coolant pump entails an additional vehicle weight, which also leads to an increased fuel consumption.

US 2,287,130 describes a hydrodynamic brake having a three-way valve connected upstream in the flow direction for opening and closing a flow path to the hydrodynamic brake. EP 0 794 326 A1 describes a retarder in a combined cooling and braking circuit.

The invention is based on the problem of creating a coolant circuit that has a coolant pump and a retarder and that is improved over the prior art. In particular, it should be possible to use a coolant pump that does not require a higher power input or power output than coolant pumps in cooling circuits without retarders.

The problem of the invention is solved by the features of claim 1. The subclaims describe especially advantageous constructions.

The invention and its advantages over the prior art will be described below on the basis of the figures, Figure 1 depicting a coolant circuit in accordance with the prior art and Figures 2 to 11 showing advantageous constructions or details of advantageous embodiments of coolant circuits of the invention.

Shown in detail are the following:

Figure 1 a schematic depiction of a motor vehicle coolant circuit having a separately arranged retarder working medium circuit with an oil retarder;

Figure 2 a first embodiment of a coolant circuit of the invention;

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AMENDED SHEET

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Inventor: Klaus Vogelsang

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Patent Claims

1. A coolant circuit of a motor vehicle, comprising
 - 1.1 a coolant;
 - 1.2 a coolant pump (1) having a coolant outlet (1.1);
 - 1.3 a retarder (1) which has a stator (2.2) and a central ring (2.1), the working medium of which is the coolant, the central ring corresponding to the part of the working chamber (2.4) of the retarder (2) that is arranged in the flow direction of the coolant downstream of a coolant-carrying retarder inlet region;
 - 1.4 a reversing valve (3) in the flow direction upstream of the retarder (2) and a bypass section (4) for bypassing the retarder (2), such that the retarder (2) can be connected to and disconnected from the coolant circuit, whereby
 - 1.5 the coolant pump (1) is arranged in the flow direction upstream of the retarder (2) in such a way that it pumps coolant into the retarder (2) when the retarder (2) is connected and pumps coolant past the retarder (2) via the bypass section (4) when the retarder (2) is disconnected, characterized by the following feature:
 - 1.6 when the retarder is connected, the total flow resistance from the outlet (1.1) of the coolant pump (1) to the central ring (2.1) of the retarder (2) is lower than the total resistance to flow of the coolant circuit to be overcome

- by the coolant pump (1) in the non-braking mode, wherein
- 1.6.1 when the retarder is connected, the coolant pump (1), the reversing valve (3), and the retarder (2) are arranged in the coolant circuit in the given order in the flow direction one directly after the other; and/or
- 1.6.2 the stator (2.2) of the retarder (2) has holes (2.3) for introducing working medium into the working chamber (2.4) of the retarder (2) and is provided on its working medium inlet side (2.5), over its entire circumference, with guide elements (2.6) for the uniform distribution of the working medium over the stator circumference; and/or

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- 1.6.3 the stator (2.2) of the retarder (2) has holes (2.3) for introducing working medium into the working chamber (2.4) of the retarder (2), the holes (2.3) being conically enlarged in the flow direction; and/or
- 1.6.4 the stator (2.2) of the retarder (2) has holes (2.3) for introducing working medium into the working chamber (2.4) of the retarder (2) that are constructed in a plurality of predetermined blades (2.7), several holes (2.3) being provided for each blade (2.7) with holes.
2. The coolant circuit according to claim 1, further characterized in that, when the retarder is connected, the total flow resistance from the outlet (1.1) of the coolant pump (1) to the central ring (2.1) of the retarder (2) is lower by 5 percent to 30 percent than the total resistance to flow of the coolant circuit to be overcome by the coolant pump (1) in the non-braking mode.
3. The coolant circuit according to either claim 1 or 2, further characterized in that, when the retarder is connected, the coolant pump (1), the reversing valve (3), and the retarder (2) are arranged in the coolant circuit in the given order in the flow direction one directly after the other
4. The coolant circuit according to either claim 1 or 2, further characterized in

that, when the retarder (2) is connected, an engine (5) that is to be cooled, particularly an internal combustion engine, is arranged in the coolant circuit in the flow direction upstream of the retarder (2) and downstream of the coolant pump (1).

5. The coolant circuit according to one of claims 1 to 3, further characterized in that, when the retarder (2) is connected, an engine (5) that is to be cooled, particularly an internal combustion engine, is arranged in the coolant circuit in the flow direction downstream of the retarder (2) and upstream of the coolant pump (1).

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6. The coolant circuit according to one of claims 1 to 5, further characterized in that the retarder (2) is a secondary retarder.
7. The coolant circuit according to one of claims 1 to 6, further characterized in that the reversing valve (3) is constructed as a rotary slide valve, which
- 7.1 comprises one inlet (3.1) and two outlets (3.2, 3.3) and
- 7.2 has a cylindrical valve piston (3.4) that can rotate around its longitudinal axis, which
- 7.3 comprises an outlet hole (3.5), which is incorporated into the valve piston (3.4) in the radial direction and can be aligned in a flush manner with each of the outlets (3.2, 3.3) by rotating the valve piston; and, in addition,
- 7.4 an inlet hole (3.6), which is incorporated in the valve piston (3.4) in the radial direction and is connected to the outlet hole (3.5) in a flow-carrying manner, whereby
- 7.5 the inlet hole (3.6) has a construction that is conically tapering proceeding radially from the outside to the inside, whereby the radial outer opening surface has a diameter that is enlarged in such a way that, regardless of the alignment of the outlet hole (3.5) with an outlet (3.2, 3.3), there is a constant flow-carrying connection to the inlet (3.1).

8. The coolant circuit according to one of claims 1 to 7, further characterized in that the stator (2.2) of the retarder (2) has holes (2.3) for introducing working medium into the working chamber (2.4) of the retarder (2) and is provided on its working medium inlet side (2.5), over its entire circumference, with guide elements (2.6), particularly ribs, for the uniform distribution of the working medium over the stator circumference.
9. The coolant circuit according to one of claims 1 to 8, further characterized in that the stator (2.2) of the retarder (2) has holes (2.3) for introducing

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Inventor: Klaus Vogelsang

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working medium into the working chamber (2.4) of the retarder (2), the holes (2.3) being conically enlarged in the flow direction.

10. The coolant circuit according to one of claims 1 to 8, further characterized in that the stator (2.2) of the retarder (2) has holes (2.3) for introducing working medium into the working chamber (2.4) of the retarder (2) that are constructed in a plurality of predetermined blades (2.7), several holes (2.3), particularly parallel holes, being provided for each blade (2.7) with holes.